Lewis Balamuth:
from the atomic bomb to the ultrasonic scaler handpiece.

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> “It is not his possession of knowledge, of irrefutable truth,
> that makes the man of science,
> but his persistent and recklessly critical quest for truth.”
> Karl Popper, The Logic of Scientific Discovery[A]

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ABSTRACT

This paper provides a detailed biographical and historical reconstruction of the life and scientific legacy of Lewis Herman Balamuth (1905–1981), the American physicist whose pioneering work in applied acoustics fundamentally transformed modern dental prophylaxis. Holding a Ph.D. in solid-state physics from Columbia University, Balamuth initially pursued an academic career at the City College of New York (CCNY), conducting research on ultrasonic wave propagation and crystal elasticity. However, his academic trajectory was abruptly disrupted during the Second Red Scare, when political persecution by the Rapp-Coudert Committee and subsequent congressional investigations (SISS) led to his dismissal from public education.

Following a brief involvement with James Franck on the Manhattan Project, Balamuth transitioned into industrial research, serving as Research Director at Cavitron Ultrasonics, Inc. There, alongside Arthur Kuris and Claus Kleesattel, he co-invented the magnetostrictive ultrasonic dental scaler (Cavitron)—a breakthrough technology that revolutionized oral healthcare and public health worldwide. Based on historical archives, patent records, and biographical sources, this study explores Balamuth's multi-faceted career, tracing his shift from academic physics to industrial innovation, and highlighting his later-life engagements with abstract expressionism, Native American culture, and esoteric philosophy.

Keywords: Lewis Balamuth, Ultrasonic scaler, Cavitron, Dental prophylaxis, Magnetostrictive transducer, Applied acoustics, History of dentistry, Manhattan Project, Rapp-Coudert Committee, Red Scare, City College of New York (CCNY).

[A] Karl Popper. The Logic of Scientific Discovery (1934). Chapter X (Corroboration, or How a Theory Resists Testing), in the final section “Open Science”.

General index

ABSTRACT....1
INTRODUCTION....2
1: ORIGINS AND ACADEMIC EDUCATION....2
2: THE HISTORICAL-POLITICAL CONTEXT AND IDEOLOGICAL PERSECUTIONS....4
3: INDUSTRIAL RESEARCH....4
4: THE SISS INVESTIGATION, THE MANHATTAN PROJECT, AND THE ABANDONMENT OF IDEOLOGY....6
5: THE REVOLUTION IN DENTISTRY: THE DEVELOPMENT OF THE ULTRASONIC SCALER HANDPIECE....8
6: THE LAST YEARS: ART, NATIVE AMERICANS AND ESOTERICISM....9
7: THE DISAPPEARANCE AND POSTHUMOUS REHABILITATION....11
REFERENCES....13

INTRODUCTION

In the history of dentistry, the invention of the ultrasonic tartar scaler radically changed the quality and effectiveness of prophylaxis procedures, greatly improving the oral health of those who could access it and confirming its essential function, practicality, and usefulness even today: a tool that has revolutionized public health with regard to oral health problems.

Credit for this invention goes to the work of Lewis Balamuth, Arthur Kuris, and Claus Kleesattel at Cavitron Ultrasonics, Inc. Balamuth, an ultrasound physicist and head of research at the company,[1] overcame many obstacles and unexpected vicissitudes to secure this fundamental patent.

Through historical sources, this original article aims to reconstruct Lewis Balamuth's biography, placing it in the context of the era in which he lived. It examines his education, academic commitment, and political beliefs, which severely compromised his career as a researcher and teacher in the public sector but paved the way for the development of numerous patents in the private sector. The essay also traces his brief collaboration with the Manhattan Project, his industrial activity, and the passions that animated his life, from science and astronomy to art and esotericism in the final phase of his life.

While the collection of biographical information is based on the fragmentary local chronicles of the time, which are given credence, the collection of publications and patents offers a much more accessible documentary path.

1: ORIGINS AND ACADEMIC EDUCATION

Lewis Balamuth (born Lewis Herman Balamuth) is known to have been born in the United States on January 31, 1905. Analysis of his rare surname suggests Eastern European Jewish ancestry.[2] Information on his family of origin is scarce. However, several philanthropic and exhibition donations made by Lewis and his family appear to be in memory of his father, Maurice Balamuth (born December 24, 1883). A comparison with the genealogy available on *FamilySearch.org* And *ancestry.com* , the name and birth year match our records, as do the names of his children; it also appears that Maurice was married to Elizabeth George (b. 1886).

The same website also contains a draft card from World War II, which shows that Maurice was working for the US Postal Service (NY Post Office) in Manhattan at the time.

Also mentioned is Lewis's brother, William (born William Benjamin, January 16, 1914, died June 10, 1981), who became a renowned expert on protozoa and amoebae and a professor at the University of California, Berkeley.[3]

Lewis received a Bachelor of Science degree from the College of the City of New York (CCNY) in 1927 and a Doctor of Philosophy degree in physics from Columbia University in 1934. He defended a thesis on the use of ultrasound to measure the elastic constants of crystals.[4] His research specialties were ultrasound and solid-state physics. This line of research was fundamental, as it laid the theoretical and experimental foundation for his subsequent and very successful career as an industrial inventor in the field of applied acoustics and ultrasound.[5] He worked as a university physics instructor (at CCNY) in the Physics Department, producing several publications, including on astronomy.[6,7,8]

In the 1949 Barnard College alumnae chronicle, it is reported that Lewis, in 1931, married Eva Saper [9], a native of Newark, New Jersey (February 22, 1912 – April 21, 2004, Hanover, New Hampshire), born Eve Sapir, also known as Eva Balamuth or by the pseudonym Eve Weinblatt,[10] daughter of Perter Sapir, born in the Russian Empire (Russisches Kaiserreich) in 1884, enrolled in the American military draft from 1917 to 1918.[11] Eva had been educated in New York at Barnard College, the renowned women's institute affiliated with Columbia University, where in 1931 she had obtained a Bachelor's Degree in zoology, winning the prestigious Caroline Duror Memorial Fellowship and the Constance Von Wahl Prize[12,.13] She then obtained a Master's Degree in biochemistry (then called physiological chemistry) at Yale University, where she was again awarded a scholarship intended for Jewish students.[14]

I insist on his wife's biography because the extension of the research has uncovered documents that directly connect to her husband's future choices. In 1935, Eva worked in New York as a research assistant in the Department of Oral Histology and Embryology at Columbia University's School of Dental and Oral Surgery. However, the contract was abruptly terminated in May of the same year: Eva and two laboratory technicians were fired by the department's director, dentist Charles F. Bodecker (1880–1965);[B] a decision motivated by their pacifist activism and proximity to left-wing trade union organizations at the university, denounced as a true act of political discrimination.[15]

She later worked for government technical offices (PWA, Department of Purchase) related to health and statistics applied to public health.[16,17] And finally as a researcher in the field of cardiovascular epidemiology where she signed Eva Saper Weinblatt.[18]

Lewis had two sons.[19] His eldest son, David, is a professor emeritus of nuclear physics at the University of Pennsylvania in Philadelphia.[20] His second son, Michael (often cited as Michael Lewis Balamuth[21]), a graduate of theoretical physics and mathematics, worked as a computer analyst and was director of Academic and Administrative Computing at the prestigious Cold Spring Harbor Laboratory in New York.[22]

[B] Charles F. Bodecker (1880–1965) Director of Research and Chairman of the Department of Oral Histology and Embryology at the School of Dental and Oral Surgery, Columbia University.

2: THE HISTORICAL-POLITICAL CONTEXT AND IDEOLOGICAL PERSECUTIONS

On January 2, 1939, George B. Pegram, chair of the Physics Department at Columbia University, welcomed Enrico Fermi as a professor at the New York university. The Italian physicist—who became famous for his discovery of neutron-induced radioactivity and the role of slow neutrons[23] —had fled Italy to protect his wife from racial laws, using his trip to Stockholm to receive the Nobel Prize as an opportunity to avoid returning home. It was at Columbia that Fermi would begin fundamental research on nuclear fission, laying the foundations for the Manhattan Project and the development of atomic energy. Although he did not work at Columbia University, it is reasonable to assume that this event significantly influenced subsequent events involving Balamuth and his political involvement.

Between 1940 and 1941, the Rapp-Coudert Committee[C] subjected Balamuth to several interrogations following accusations made by several witnesses — including colleague William Martin Canning — who indicated that he was an active member of the clandestine communist cell within the City College department.

Figure 1: Lewis Balamuth at 35 years old, participating with other dismissed professors in a peace strike at Lewisohn Stadium on April 23, 1941.

Balamuth steadfastly denied any wrongdoing. Nevertheless, the New York Board of Higher Education accused him of perjury and of being subject to the ideological discipline of a conspiratorial foreign power, eventually forcing him to resign and face certain dismissal in late 1941.[24,25]

3: INDUSTRIAL RESEARCH

In 1942, having served as director of research in the field of industrial biological acoustics, immediately after leaving CCNY, Balamuth co-founded Balco Research Laboratories (later Balco Corp.)[D] with fellow scientists and ousted former faculty members Morris U. Cohen and Joseph Steigman. This core group of physicists and chemists independently pursued the scientific research that the university had precluded them from pursuing. Advanced research was conducted under Balamuth's direction at a branch of Balco, the Technical Research Labs, in Montclair, NJ. Here, they specialized in high-resistance miniaturized components, ultrasound, and advanced automatic printed circuit boards, with orders also for the US Army and US Navy.[26] Balamuth himself, in subsequent interrogations, declared that the funding came from Ellis-Foster Corp. This company operated by directly financing the associated laboratories and Montclair researchers to develop and file shared patents; the president of the Technical Research Labs was John Edward Burrows, a well-known patent attorney.

[C] The Joint Legislative Committee to Investigate the Educational System of the State of New York (known as the Rapp-Coudert Committee) was a state investigative committee established with the power to investigate the school and university system. Its objective was to identify and expel public employees and educators suspected of subversion or membership in the Communist Party of the United States (CPUSA), a status deemed incompatible with teaching under New York State law. These measures arose from the belief that the ties between the American Communist Party and the Soviet Union posed a dangerous threat and a form of conspiracy.

[D] BALCO is an acronym for BALamuth & COhen partners and shareholders.

In those years, there was considerable excitement in nuclear physics and ultrasound research. In 1942, a group of researchers from Columbia University in New York published a fundamental study on the biological use of concentric ultrasound beams.[27] The principle behind the technique was to make the beams intersect at a precise point: the intersection generated a strong thermal effect which, in the presence of energy peaks, could trigger the phenomenon of cavitation. The primary objective was to specifically destroy pathological tissue, even in neurosurgery , intervening within the structures without damaging surrounding healthy tissue and sparing the patient complex invasive procedures. This pioneering approach laid the foundation for the technology now known as HIFU (*High-Intensity Focused Ultrasound*), still widely used in medicine with due evolution and clinical indications.

Following his resignation from CCNY, Balamuth's scientific communication paradigm changed radically: the author ceased publishing academic articles—limiting himself to popular contributions—and oriented his scientific activity toward filing patents and submitting abstracts at conferences and papers at physics symposia.

He also worked as a research director from 1943 to 1945 at the Gussack Machined Products Co., Long Island City, NY, whose general manager and co-owner, Moses Cammer, employed many professionals who had been blacklisted as communists, including the chemist Sidney Eisenberger.[28]

In 1947, he joined Cavitron Equipment Corporation (later known as Cavitron Ultrasonics, Inc.),[E] where he served as vice president and head of research and development. At the beginning of 1952, on January 1st, Lewis Balamuth obtained the historic U.S. patent US2580716A[29] for "Removing material from a solid body" (US Patent No. 2580716A).[F] This milestone marked the beginning of an important licensing and technical collaboration with Raytheon Manufacturing Co.: Cavitron entered into cross-licensing agreements with Raytheon, which acquired the rights to manufacture and use industrial machinery based on Balamuth's patents, particularly for ultrasonic cutting and drilling of hard materials and semiconductors.

[E] Not to be confused with the “Cavitron” invented shortly before by the famous and particularly long-lived physicist Richard F. Post: A Proposed High Energy Particle Accelerator—The Cavitron . Naval Research Laboratory, Washington, DC Phys. Rev. 69, 126 – Published 1 February 1946. The project aimed to use resonant radio frequency cavities to accelerate particles to very high energies. It never became a functioning machine, but studies on this type of accelerator contributed to the birth of modern linear particle accelerators.

[F] Balamuth's goal was to design a method capable of: removing material from a solid body with extreme precision, avoiding the application of excessive heat or violent mechanical pressure on the workpiece, and creating cavities of any geometric shape (even non-circular) in the most fragile materials. The patent describes the use of high-frequency vibrations (in the ultrasonic spectrum between 20,000 and 40,000 Hz) combined with an abrasive mixture (such as silicon carbide, aluminum oxide, or boron carbide). The intended application was in precision engineering: machining semiconductors (germanium), quartz, and optical glass.

4: THE SISS INVESTIGATION, THE MANHATTAN PROJECT, AND THE ABANDONMENT OF IDEOLOGY

On May 12, 1953, at the height of McCarthyism,[G] the United States Senate Subcommittee on Internal Security (SISS) subjected physicist Lewis Balamuth to a second round of questioning for his communist ties. The investigation focused both on his past activities at City College and on his postwar lecture at the Jefferson School (a notoriously communist school) on the topic of atomic energy. Due to his full cooperation, he was spared any charges.[30]

Serious heart problems prevent him from attending the SISS public hearings, but his verbal behavior is "extremely cooperative." During his testimony, Balamuth stated the following:

Recruitment: He admits being recruited into the Communist Party by Morris Schappes around 1936, taking the cover name of "John Weston" (or Comrade Weston).

The City College Cell: Confirms the identity of the members of the college's communist cell, validating names previously given by William Canning.

Hiring at the Technical Research Laboratories: He explains that he had two other scientists who had been purged for political reasons, Iven Hurlinger and Lloyd Motz, hired at the laboratories, acting solely out of solidarity and a spirit of helpfulness.

Military contracts and espionage: Although the laboratories had ongoing contracts with the US Navy for the production of anti-reflective lenses, he categorically denies having ever passed information to the Soviets or having ever been approached for this purpose.

The contact with the University of Chicago: He says that in 1943, the university contacted him to involve him in the Manhattan Project. When the president of the laboratories, Burrows, expressed his surprise over the phone at Balamuth's political past, the university headquarters replied that they were looking for him specifically.

Contribution to the Manhattan Project: Initiated by physicist James Franck, the project aimed to apply an ultrasound method (developed by Balamuth in his doctoral thesis at Columbia University) to measure the elastic properties of materials, particularly graphite.[H] Balamuth pointed out that a former colleague of his, Dr. Siegel, was working at Westinghouse Laboratories and had access to more advanced equipment. Franck then sent him to Siegel in Pittsburgh to pick up the device's blueprints; once he had the material, Balamuth handed it over to the Manhattan Project leaders and returned to New York, thus concluding his very brief collaboration.

Military secrecy: he claims to have maintained absolute secrecy about this collaboration, not even revealing anything to his wife!

[G] McCarthyism , named after Senator Joseph McCarthy, was a highly uncompromising policy manifested in the discrimination and persecution of both individuals and legal entities, considered pro-Communist and therefore contrary to national values. The Internal Security Act of 1950 (also known as the McCarran Act) declared the international Communist movement a threat to the security of the United States and required the registration of Communist-affiliated organizations. New York State's Feinberg Act of 1949 barred Communist Party members from teaching in public schools and universities. The United States Supreme Court declared these laws unconstitutional in 1967-68.

[H] Graphite is used as a moderator to slow down fast neutrons and transform them into thermal neutrons, enabling them to interact with the nucleus of a fissile atom. This material has the highest sublimation temperature (it does not melt) of all natural elements and is an excellent electrical conductor, useful for dissipating any plasma ionization. An interesting fact: the flaking of individual layers of graphite today yields graphene.

Post-war lessons: In November 1945 he accepted the invitation to hold a series of lectures on atomic energy at the Jefferson School (a communist-oriented school), driven mainly by the "hunger for teaching" after years spent in the industrial sector (Fig.2).

Abandoning Ideology: He explains that in 1944, a severe heart attack (coronary artery disease) due to stress confined him to bed. He thus began a six-year course of psychoanalysis to overcome severe anxiety. During that period of isolation and reflection, he realized he had been deceived: he, always anti-authoritarian, had become involved in a profoundly authoritarian organization. He concludes by stating that the frenetic activity and duties imposed by the communist cell (meetings, writing articles, obligation to demonstrate) took away precious time from scientific research, destroying his value as a scholar. When asked whether a militant communist, subject to party discipline, could be a free and good teacher, Balamuth answers with a clear "No."

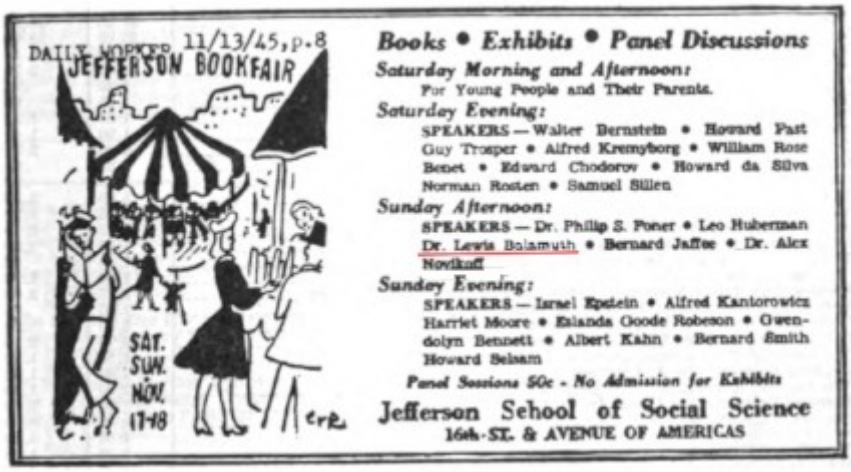
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Figure 2: Lewis Balamuth speaking at the Jefferson School. He gave his lecture on the same day as Alex B. Novikoff, a potential Nobel laureate for his biological discoveries who was dismissed for his ties to communism. Taken from the SISS (Senate Internal Security Subcommittee) hearing.

It is necessary to briefly discuss the consensus surrounding the Communist Party in the United States over time. With fluctuating trends since 1917 (the year of the October Revolution and the establishment of the communist regime in the USSR), the Communist Party of the United States of America (CPUSA) experienced periods of growth linked to economic crises—particularly that of 1929—and labor struggles. However, its progressive disaffection and decline in support—even more than American anti-communist propaganda (the so-called "Red Scare")—were driven by the dramatic news from the Soviet Union. These included the "Moscow Trials" and the Great Terror, characterized by purges and summary executions of opponents; the brutal assassination of Leon Trotsky in Mexico City; the 1939 Molotov-Ribbentrop Pact for the partition of Poland and the Baltic States with Nazi Germany; Finally, Khrushchev's 1956 "Secret Speech," intercepted by the CIA and released by the American media, which openly denounced Stalin's crimes, marked the point of no return for the party's credibility.

5: THE REVOLUTION IN DENTISTRY: THE DEVELOPMENT OF THE ULTRASONIC SCALER HANDPIECE

Subsequently, the scientist continued to work within Cavitron to apply the exact same technology patented in 1952 (US2580716A) from the industrial sector to the dental sector.

Balamuth himself recounts the development of the use of ultrasound in dentistry, stating that research began in November 1952 using his first patent for an industrial ultrasonic impact grinder on extracted teeth.[31]

After the presentation in New York of a first abstract by two professors from Columbia University on the use of this equipment for the preparation of tooth cavities through the use of abrasive substances,[32] Balamuth made the appropriate modifications to the original industrial technology and submitted, on 24 December 1954, the patent application for an innovative handpiece instrument ("Dental Instrument"): it was a magnetostrictive device based on a laminated nickel core (nickel stack).[33]

The following year saw a rapid flow of publications, among the first to be cited was Zinner's abstract from March 18-20, 1955, which used the Cavitron dental instrument for abrasive-free scaling.[34] However, on March 23, the same year, Balamuth and Strock published further abstracts on the use of the Cavitron dental instrument.[35,36] Increasingly extensive case series and the absence of problems with dental tissue made it a standard in dental practices.

Balamuth states that as of June 1955, 150 ultrasound machines had been manufactured by Cavitron and more than 4,000 patients had been treated.[37]

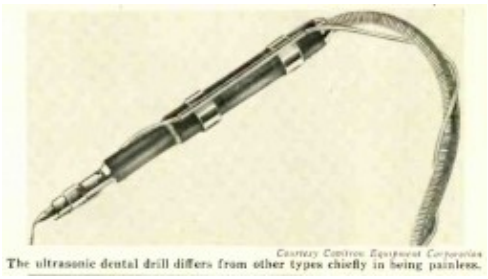
Courtesy Cavitron Equipment Corporation
The ultrasonic dental drill differs from other types chiefly in being painless.

Figure 3: ultrasonic handpiece created in 1955.

In 1957, together with Arthur Kuris, he obtained another patent for an ultrasonic machine tool [38] with vibrations transmitted to a working tip for cutting, drilling, milling, or engraving metals, glass, ceramics, and other materials difficult to work with traditional tools. Equipped with an integrated cooling and lubrication system, this system removes debris and prevents overheating of the workpiece and tip during processing.

In 1958, while Balamuth was now admittedly disillusioned with communist ideology, an article published in an independent newspaper close to the radical left revealed a background story from 1957: the Board of Education's dismissal of Professor Warren B. Austin—a renowned literature professor with 27 years of service at City College—had been based largely on statements made by Lewis Balamuth himself. Austin's defense attorney, Ephraim London, harshly attacked Balamuth, calling him an "admitted perjurer." This accusation referred to the 1953 hearings, in which Balamuth, in order to cooperate with the Senate and save his position, had admitted to lying under oath in 1941, naming colleagues and acquaintances linked to the Communist Party.[39]

Figure 4: Balamuth in 1963 at 57 years old. From IEEE Transactions on Ultrasonics Engineering.

In 1961, the Cavitron device was acquired by the Dentsply giant,[40] ensuring the product's widespread and commercialization, first in the United States and subsequently internationally. Carleton Ellis Jr., (Balamuth knew his father because he had financed the aforementioned BALCO through the Ellis-Foster Company in 1942), [l]president of Cavitron's Specialty Products Division, officially announcing the change to distributors, stated: "The vast experience, knowledge, and recognized preeminence of the Dentists' Supply Company [Dentsply] in the dental industry, combined with the creative, technical, and engineering talents of Cavitron, will lead to developments in the field of ultrasonics that will benefit both the patient and the profession." This was a far-sighted insight, echoing comments in the trade press at the time, which predicted that the use of ultrasonics in dentistry would soon become a "standard."

For this invention Balamuth is remembered - rightly - in the roll of honor of innovators in the dental field.[41]

In 1963, following the launch of the ultrasonic handpiece in the New York Times,[42] he invented a rotating ultrasonic drill.[43] That same year, Cavitron Ultrasonics, Inc. released the Cavitron Model 660 at a price of approximately $800, equivalent to $8,418 in today's dollars (approximately €7,745 in July 2026), a considerable cost for such innovative technology. An example of this historic ultrasonic device is now housed at the Smithsonian Institution's National Museum of American History.[44] Its presence in such an institutional collection testifies to the revolutionary role the device played in dentistry: it spearheaded a fundamental paradigm shift, transforming chairside services from simple reactive care interventions to modern prophylaxis and prevention treatments for the oral cavity.

Figure 5: Balamuth in 1972 at age 66, in the NYT.

In the early 1970s, he moved to Ultrasonic Systems, Inc. in Farmingdale, a manufacturer of ultrasonic motors, as director of research. There, he obtained a patent for an ultrasonic cauterizer used in surgery to stop bleeding.

Some of his inventions and co-inventions include the ultrasonic impact grinding process, the ultrasonic dental drill, the ultrasonic prophylaxis unit, new processes for cleaning jet aircraft filters, ultrasonic welding devices, and surgical scalpels. He edited[45] a series of books on ultrasonic technologies for Springer.[46] Balamuth was a member of the Institute of Radio Engineers, the American Physical Society, and the Acoustical Society of America.

6: THE LAST YEARS: ART, NATIVE AMERICANS AND ESOTERICISM

Lewis Balamuth and his wife, Eva, moved to Southampton in 1972 and were closely associated with the circle of American Abstract Expressionists and Modernists, particularly within the Shinnecock Hills art community in Southampton, Long Island. The abstract painters with whom Balamuth maintained close friendships and correspondence were:

[l]Carleton Ellis Jr., eldest son of the famous chemist Carleton Ellis, was brought into the business of the Ellis-Foster Co. to manage the immense patent wealth accumulated by the family laboratories in Montclair, New Jersey.

George Constant (1892–1978): a celebrated Greek-born painter and printmaker, considered one of the pioneers of modern and abstract art on Long Island. Official documents archived at the Smithsonian contain frequent personal letters exchanged between Constant and Lewis Balamuth. [47]Theo Hios (1908–1997): another important exponent of Abstract Expressionism. Their connection was so close that Dr. Balamuth and his wife owned several of his works (such as the Phoebus and Involution series), later donated to the Parrish Art Museum in New York. After the physicist's passing, his wife Eva Balamuth continued to nurture the legacy of this group, organizing the group exhibition "Koumbaroi [J]: Four Artists of the Shinnecock Hills" (Theo Hios, Lewis Trakis, George Constant and Michael Lekakis) in 1990 to celebrate these historic artistic connections.

Lewis boasted a substantial and renowned private collection of Native American artifacts, historical jewelry, and fetishes, with a particular predilection for Zuni culture. The art and jewelry from his collection were donated in memory of Maurice by Lewis, Eva, and his son Michael to the National Museum of the American Indian and other institutions of the Smithsonian Institution in New York.[48] His familiarity with Native American animism found ideal resonance in the last phase of Lewis's life, characterized by a profound interest in esotericism, through lectures and the creation of art objects.

In 1973, Lewis gave a lecture on the relationship between humanity and the environment. Firmly convinced that the Earth was a living being,[49] in 1976 he presented [K] a series of talks to the Lindisfarne Association, the audio recordings of which are still available.[50] A man plagued by heart disease, without falling into the trap of "parascience"—avoiding facile justifications for phenomena that science struggles to define—he kept the exoteric from the esoteric,[L] mathematically [M] defining the latter as the reciprocal, or inverse, of the former.

As mentioned in the preamble to this article, Karl Popper defined a scientist as someone who conducts a "critical, persistent, and restless search for truth." Lewis Balamuth also pursued this quest with dedication until the very end: thanks to his ingenuity, he gave us tools that have significantly improved the quality of dental work and, more generally, oral health. He deserves to be remembered with gratitude and respect.

[J] Koumbaroi (plural koumbaroi) is a Greek word that refers to a key figure in Greek Orthodox rites, particularly during weddings and baptisms. The word shares its root with the Italian dialect "comparo" / "compare" (from the Latin compater, meaning "he who is a father together with you" or "godfather"). In both cultures (Greek and Southern Italian), the term expresses not only the role of godfather/best man, but a lifelong bond of companionship, trust, and brotherhood.

[K] Lindisfarne Association founded in 1972 by philosopher William Irwin Thompson with the aim of studying and creating a new planetary culture.

[L] E x oteric: from the Ancient Greek exōterikós, meaning "external" or "facing outwards", obvious to all.

[M] Es oteric : from the Ancient Greek esōterikós, meaning "inner," "intimate," or "turning inward."

7: THE DISAPPEARANCE AND POSTHUMOUS REHABILITATION

He died of a heart attack in Suffolk, New York, on October 7, 1981, at the age of 75.[51] He was attended by his wife, Eva, and Dr. Kenneth Cairns.[52]

CCNY's official apology for his 1941 unfair dismissal would not come until days after his death: on October 26, 1981, the academics expressed "Profound regret at the injustice done to the faculty and staff who had been dismissed or forced to resign in 1941 and 1942 because of their alleged political associations and beliefs and their unwillingness to testify publicly about them."[53]

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